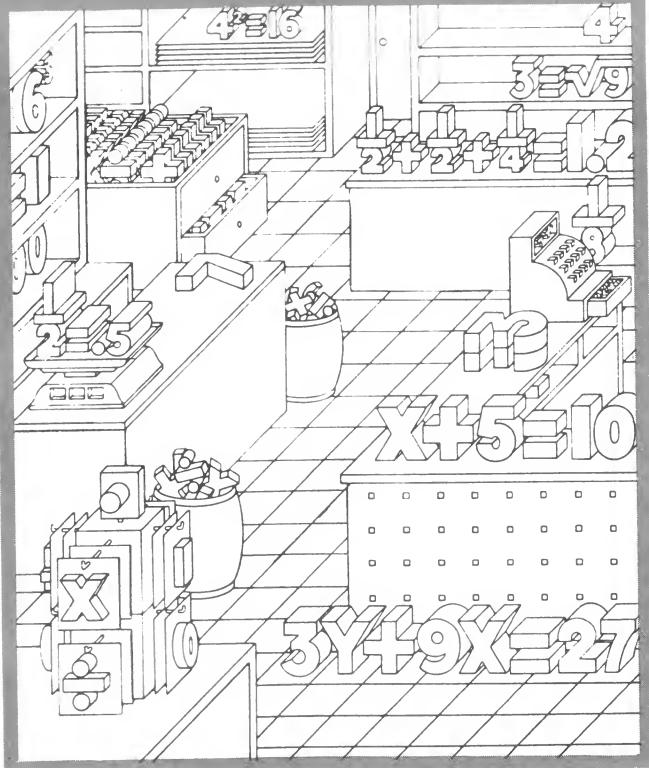


ADVANCED **MATH SHOP**TM

LEARN MATH FASTER IN TEN REAL-WORLD SHOPPING SIMULATIONS.



MATH SKILLS

 SCHOLASTIC

| | |
|---|---|
| Program Concept, Design, and Programming | Cary Hammer |
| Educational Consultants | Robert Keller, Beth Lazerick |
| Handbook Author | David Bowman |
| Worksheet Author | George Ropes |
| Mini-bold Character Set | George Brackett |
| Published by | Scholastic Software 730 Broadway New York, NY 10003 |
| Publisher | Peter Kelman |
| Director of Technology | Walter J. Koetke |
| Director of Product Development | Philip H. Miller |
| Senior Project Editor | Robert Neumann |
| Project Editor | Laura Jeffers |
| Production Manager | Pamela Lawson |
| Production Editor | Martine Coscia |
| Manufacturing Manager | Meryl Wolfe |



Scholastic Inc. New York Toronto London Auckland Sydney

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GUIDE TO THE PROGRAM

What's in Store for You?

The shops in the *Advanced Math Shop™* mall are at a standstill. The shop owners need help! The owner of the pie shop is hungry for an assistant to cut pies. The soda store owner is all shook up because no one knows the number of cartons to load onto the soda truck. In fact, all 10 shop owners are in need of an astounding algebra assistant like you! Put your math skills to work as you solve some tricky problems, and lend a hand to help keep each *Advanced Math Shop* in business.

Where does the work begin? You can start by packing cartons and cases of soda in the soda store. Or maybe you'd prefer to weigh cheese in the cheese shop, or sell carpet in the carpet store. It's your choice. You can ride the elevator and explore the shops on the second and third floors where the work is harder. Try your hand at cubing blocks of ice, packing jelly beans, and even solving equations.

You'll receive plenty of on-the-job training at each shop. Some shops will have easy work for you to do. Other shops will give you more difficult tasks. In each shop, the challenge will increase as your skills improve.

Work in an *Advanced Math Shop* can be scheduled as you like. In the One Shop game, you may work as long as you like, serving as many customers as you please. Or you can work against the clock and try to serve as many customers as you can during a simulated shopping day.

When you've gained some experience in each *Advanced Math Shop*, try the All Shops game. Customers will be waiting for your help at all 10 shops. You'll really have to keep moving! With good work, you may even earn the honor of putting your name on the list of Top Ten Employees! What a way to launch your career!

Getting Started (Apple Computer)

Equipment You Will Need

- Apple II Plus (64K), IIe, IIC, or IIGS
- One disk drive
- A monitor or TV

Loading *Advanced Math Shop* into your Apple Computer:

1. Insert the *Advanced Math Shop* disk, label facing up, in the drive, and close the drive door.
2. Turn on the monitor or TV and the computer.
3. The disk drive will whirr as *Advanced Math Shop* loads. Do not remove the disk while the drive's power light is on.
4. Follow the instructions on the screen to remove the disk. Then turn it over to Side 2 (label facing down), reinsert it, and press Return. The program will load into your computer.

NOTE: In the 3.5-inch version of Advanced Math Shop the entire program is on one side of the disk. If you are using this version, skip Step 4.

Getting Started (IBM or Tandy Computer)

Equipment You Will Need

- An IBM PC with color graphics card, PCjr, Tandy 1000, or 100% compatible computer with 256K of memory
- A double-sided disk drive
- A monitor or TV
- A DOS disk (version 2.0 or higher)

Installing DOS on the *Advanced Math Shop* Disk

Before you use the *Advanced Math Shop* disk, you'll want to add a copy of MS-DOS to it so that you can start up *Advanced Math Shop* with the program disk alone. This procedure is called "installing" DOS. To install DOS onto your *Advanced Math Shop* disk, follow the steps below. You'll only have to go through these steps once. After you've installed DOS onto your program disk, you will not need your DOS disk when working with *Advanced Math Shop*.

NOTE: If you are using a PCjr, or if you are using certain versions of DOS, you will not be able to install DOS on your Advanced Math Shop disk. To load Advanced Math Shop, first load DOS into your computer. Then, at the A> prompt, insert the Advanced Math Shop disk, type Algebra, and press Enter.

Installing DOS on the disk:

1. Make sure your computer is turned off.
2. Turn on your monitor.
3. Insert the DOS disk that came with your computer into Drive A. (Make sure that it is DOS 2.0 or higher.)
4. Turn on the computer. Prompts will appear on the screen telling you to enter the date and the time. Press Enter twice to skip these requests, or enter the date and the time and press Enter after each entry. When the A> prompt appears on your screen you are ready to install DOS.

5. If you have two disk drives:

- Leave the DOS disk in drive A and insert the *Advanced Math Shop* disk in Drive B.
- Type **B:INSTALL**. Press Enter.

If you have one disk drive:

- Type **B:INSTALL**. Press Enter.
- Remove your DOS disk from the disk drive and insert the *Advanced Math Shop* disk.
- Press any key to continue.

6. Read the message that appears on your screen and press any key to continue.

If you have one disk drive, you will be asked to switch disks several times. Place the DOS disk in the drive when you are asked to insert the diskette for Drive A. Place the *Advanced Math Shop* disk in the drive when you are asked to insert the diskette for Drive B. Make sure you wait until the drive's power light is off before removing a disk.

7. After you have installed DOS on the disk, the **A>** prompt will appear on your screen. The *Advanced Math Shop* disk is now ready for use.

Loading *Advanced Math Shop* into Your IBM Computer

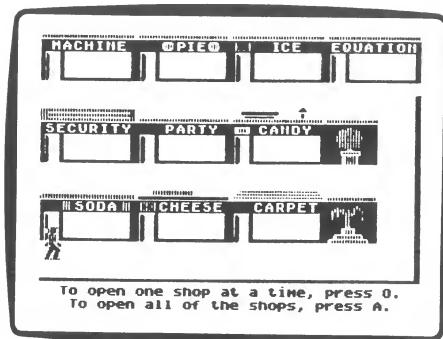
Follow these steps:

1. Insert the *Advanced Math Shop* disk, label facing up, into the drive, and close the drive door.
2. Turn on the monitor or TV and the computer.
3. The disk drive will whirr as *Advanced Math Shop* loads into the computer. Do not remove the disk while the drive's power light is on.

After the program has loaded, you will see the *Advanced Math Shop* mall on the screen. If the program does not load, it may mean that you are using a type of DOS that cannot be installed on your *Advanced Math Shop* disk. To load *Advanced Math Shop* without installing DOS, follow the instructions in the note on page 6.

Choosing a Game

After the program has loaded, the *Advanced Math Shop* mall will appear on the screen. You are the little figure that appears at the lower corner of the mall. This message will appear at the bottom of the screen: "To open one shop at a time, press O. To open all of the shops, press A."



Follow these steps to choose a game:

One Shop Game

Press O to play the One Shop game. The program will ask, "Do you want to work against the clock? Y/N."

Press N for No if you want to have unlimited time to work in any shop in the mall.

Press Y for Yes if you want to test yourself to see how many customers you can serve during a nine-to-five shopping day.

All Shops Game

Type **A** to play the All Shops game. In this game customers will be lined up in all shops, waiting to be served. As soon as you press **A**, the game will begin and the program will be keeping track of how quickly you serve customers.

For either the One Shop or All Shops game, walk or ride the elevator to the shop of your choice. Press the Space Bar to go inside. Now you're ready to begin serving customers. Once inside the shop, type **I** to get instructions, or type **S** to start working.

Read the sections that follow to learn about the different *Advanced Math Shop* games and how to switch between them.

The One Shop Game Without the Clock

If you are new to *Advanced Math Shop*, start by choosing the One Shop game without the clock. In this game you can go into any shop you want and serve customers at your own pace. The game will end when you press Esc to leave the shop.

Serving Customers

When you enter the shop, you'll see "Customers Served" at the top of the screen. This will keep track of the number of customers you've served.

In this game, you don't need to hurry to serve customers. Customers will wait patiently until you correctly fill their orders. If you enter an incorrect answer, a helpful message will appear at the bottom of the screen. Read the message, look at your mistake carefully, and then try to correct it in your new answer. Entering educated guesses or estimates of the answer is a good way to learn about solving the problems. If you get stumped, refer to the examples in this manual for additional information about each shop.

After you've correctly served a customer, you'll move on to the next one. You can continue working until you want to quit. To quit, press Esc to leave the shop and return to the mall. You can now enter a different shop and serve customers, or choose to play a different game.

The One Shop Game With the Clock

This game is played the same way as the One Shop game, without the clock, except that when you enter a shop you will have a time limit for serving each customer. The goal is to serve as many customers as you can during a nine-to-five shopping day. At the top of the screen, you'll see a number labeled "Customers Served," which keeps track of your score, and the clock, which keeps track of the time.

You will work from 9:00 am to 5:00 pm. You'll notice that the minutes tick away very quickly. (The actual time from 9:00 to 5:00 is approximately five minutes.) Once 5:00 comes around, the shop automatically closes and your score will appear on the screen. You'll get one point for each customer you've served during the game. Make a note of this score and try to work even faster to serve more customers the next time you work in that shop.

The All Shops Game

In the All Shops game, you will serve as many customers as you can in all 10 shops.

When you begin the game, you'll notice that there are customers waiting to be served in many of the shops. All the shops are open for business in the All Shops game, and more customers will arrive as you work. As everyone knows, customers don't like to wait in lines, especially in crowded shops. You'll have to work as quickly as you can because, when there are 10 customers in a shop, the customers will grow impatient and all 10 will leave. The game will end when 50 customers have left the mall.

To begin working, follow the instructions on page 9 to enter one of the shops. Once you are inside a shop, you'll see "Customers Waiting" at the top of the screen. This tells you the number of customers in this shop. No additional customers will enter this shop while you are working. When you serve all the customers, the "Customers Waiting" number will reach zero and you will automatically return to the mall.

Remember, you do not have to serve all the customers in line. While you are serving customers in one shop, customers are lining up in others. It is a good idea to serve a few customers in one shop, then enter another shop to serve a few customers there. This way you will avoid losing 10 customers from one store while you are serving customers in another. You can return to the mall at any time by pressing Esc. You can then enter a different shop and serve more customers.

As you continue to serve customers in each shop, their orders will become more difficult. You can leave a shop without serving a particular customer, but when you return, the demands of the new customers will be on the same level of difficulty as when you left the shop.

Keep track of the following two labels that appear at the top of the mall:

"Customers Served" This shows you the total number of customers you've served in all of the shops you've worked in. When you end the game, this will be your final score.

"Customers Lost" This shows the number of impatient customers who have left the mall because they waited in line too long without being served.

A shop will become overcrowded when the tenth customer arrives. At that point all 10 customers will lose their patience and leave the shop. Ten customers will be added to "Customers Lost." But don't worry. This is bound to happen fairly frequently. After all, how can you possibly serve all the customers in an entire mall by yourself? In the meantime, there are many more customers needing help at the other nine shops, and new ones will soon start lining up again in the shop that has just emptied. Just try to work as quickly as you can to serve as many customers as you can before the end of the game.

How the Game Ends

At some point, no matter how good you are at this game, you will find that customers are arriving at shops faster than you can serve them. Eventually the "Customers Lost" number will reach 50. This signals the end of the game. The score screen will show how many customers you served at each of the 10 shops.

If you've done exceptional work, you may get to put your name on the list of Top Ten Employees. The 10 highest scores will make this list.

Erasing the Top Ten Employees List

When your figure is standing in the mall, hold down the Control key while you press the C key (Ctrl-C) to erase the list of Top Ten Employees. This will clear the list and make room for 10 new scores.

Closing Specific Shops

If you want to limit the number of shops you can work in the All Shops game, you can close specific shops. When you play the All Shops game, customers will not enter those shops.

To close a shop, after you type A for the All Shops game, move your figure in front of the shop you want to close and hold down the Control key while you press the O key (Ctrl-O). A "closed" sign will appear in the window. No customers will enter the shop during the game.

To open a shop that has been closed, move your figure in front of that shop and press Ctrl-O again. The "closed" sign will disappear from the shop window.

Tips for Playing the All Shops Game

Here are some playing strategies:

1. Head for the most crowded shops first. The more customers waiting in a line, the closer the shop is to being overcrowded.
2. Try to avoid taking long walks from one end of the mall to the other. Walking from shop to shop uses up precious time—time that could be spent working! So, unless there are large crowds elsewhere, try to work in nearby shops first.
3. Serve at least a few of the customers at each shop, even if you think some shops are more difficult than others. Remember, in all shops, the first customers are the easiest ones to serve. Even if you serve only three customers, you will delay overcrowding. This will give you more time to help in the other, easier shops.

-
4. Just because a shop overflows, don't think that you can't work there again. More customers will arrive, eager to be served.
 5. A shop can never overflow while you're working there, so you can let a shop line build up to nine customers. Then, if you enter that shop before the tenth customer arrives, you can stay and work without worrying that it will overflow while you're there.
 6. As you play the All Shops game, write down the names of the shops that give you trouble. Then switch to the One Shop game and enter each of those shops for practice. After a few practice sessions, try the All Shops game again. You should find that your score improves.

Keys to Know

Use the following keys for both the One Shop and All Shop games to move your figure through the mall and solve the problems in each shop.

Moving Around the Mall

- To walk: Press ← or → to walk left and right. (On the Apple II Plus, press J to walk left, and K to walk right.)
- To ride the elevator: Walk your figure over to the elevator platform that appears on the right side of the mall, then press ↑ or ↓ to ride the elevator up or down. (On the Apple II Plus, press the I key to ride up and M to ride down.)
- To enter a shop: Walk your figure to the front of the shop and then press the Space Bar. Your figure will enter the shop.

Working in a Shop

- To read instructions: Before you begin to work in a shop, press I to read the instructions for that shop.
- To start working inside a shop: Press S to begin working.
- To enter a number: Type the number and press Return (or Enter).
- To move the blinking arrow: Press Return (or Enter), or press ← or → to move the blinking arrow. You can enter a new number, change a number, or erase a mistake.
- To change a number: Type the new number over the old number.
- To erase mistakes: Press the Backspace key and type a new number (or press the Delete key on the Apple IIe, IIc, or IIGS).
- To serve a customer: After you have entered your answer(s), press the Space Bar to serve the customer. If you've answered correctly, the next customer will step up to be served. If not, you'll get to try again.
- To leave a shop: Press Esc to leave a shop.
- To quit (One Shop game): Press Esc to leave a shop and end the One Shop game.
- To quit (All Shops game): Press Esc while your figure is standing in the mall to end the game.

-
- To switch shop settings: If you are playing the One Shop game and you want to turn the clock on or off, press Esc when your figure is in the mall. The program will display your choices at the bottom of the screen. After you choose the new setup, start the new game by entering a shop.
If you are playing the All Shops game, press Esc when your figure is in the mall. Now choose a new setup.
 - To turn the sound on or off: Press Ctrl-S (hold down the Control key and press the S key at the same time) at any time to turn the sound off. Press Ctrl-S again to turn the sound back on.
 - To erase the list of Top Ten Employees: Press Ctrl-C to erase the list of Top Ten Employees.

GUIDE TO THE ADVANCED MATH SHOPS

Here is a step-by-step description of each store in the mall. You'll find that each store is very different. Browsing through the following pages is a good way to decide where and how to work when you start on the computer.

But don't wait too long to start working. Your help is needed in every shop! You will probably find it easiest to start on the first floor and work at either the soda store, cheese shop, or carpet shop. Remember, when you enter any store, you can get instructions by pressing the I key.

The Soda Store

Odd Lot Soda Pop is the fizziest store in the mall! Customers order so many bottles that cartons of the peppy soda have to be delivered by truck to their homes. Thirsty customers are lining up, but the order room is short staffed. Why don't you pop in and help?

Your Job

Please load the truck and fill each customer's order. Decide what size cartons to use, and how many of those cartons need to be loaded on the truck to match the number of bottles in the customer's order. Use the carton sizes that are in stock. You can load as many of the cartons on the truck as you need.

What Happens

On the top of the screen, you'll see the number of bottles in the customer's order. The different-sized cartons are stacked on the left side of the screen. The number of bottles in each carton is stamped on its side. Your job is to choose the size of the carton you want and the number of those cartons that need to be loaded on the truck.

What You Figure Out

What carton size is a factor of the number of bottles in the customer's order? How many cartons of that size should you load on the truck to fill the customer's order?

For example, if the customer orders 22 bottles of soda, you could load two of the 11-bottle cartons onto the truck because 11 is a factor of 22:

$$11 \times 2 = 22$$

What Else Is in Store

After the first few customers, you'll have to fill orders using cases of soda. The cases will appear in the middle of the screen. The number of cartons that can fit in each case will be stamped on its side. You will choose what size carton to use, what size case to fill with those cartons, and how many cases to load onto the truck to fill the customer's order.

Job Skills

- Factoring
- Multiplication and division of whole numbers

The Cheese Shop

Chunk E. Cheese's regular customers order their cheese in decimal weight. Chunk E. even has a nifty decimal-weight scale. Today, he just received pieces of delicious Fractionia cheese. The weight of the cheese is written in fractions, not decimals. Can you help Chunk E. weigh out this problem?

Your Job

Please choose either one, two, or three pieces of cheese that, when weighed together, will match the weight the customer ordered. You will have three different weights of cheese to choose from. You can use any weight up to three times.

What Happens

On the top of the screen, you'll see the customer's order in decimal weight. The three different pieces of cheese you can use will appear on the counter. The weight of each cheese is stamped on its side. Choose any combination of weights that, added together, will match the customer's order.

What You Figure Out

What combination of weights will fill the order? Is it easier to convert the weight the customer ordered from a decimal to a fraction, or convert the weight of the cheeses from fractions to decimals?

For example, if the customer wants 1.50 pounds of cheese, you could supply a 3/4-pound piece, a 1/4-pound piece, and a 1/2-pound piece.

$$\frac{3}{4} + \frac{1}{4} + \frac{1}{2} = 1\frac{1}{2} = 1.50 \text{ or,}$$

$$\frac{3}{4} = .75; \frac{1}{4} = .25; \frac{1}{2} = .50 \text{ and } .75 + .25 + .50 = 1.50$$

What Else Is in Store

After the first few customers you can choose from five different pieces of cheese with different weights. A little later, you can choose from seven different pieces of cheese with different weights.

Job Skills

- Converting fractions to decimals
- Converting decimals to fractions
- Adding fractions
- Adding decimals

The Carpet Store

Square Deal Carpets really rolls out the red carpet for its customers. This store has great prices because it only stocks square pieces of carpet. The problem is, the current clerk is cutting corners. See if you can help before the customers find the rug pulled out from under them!

Your Job

Please choose one or two square pieces of carpet whose total square footage equals the customer's order. You can use any one or two square pieces of carpet you want.

What Happens

On the top of the screen, the square footage of the customer's order will appear. Decide whether one or two different square pieces of carpet are needed to fill the customer's order, and what size they need to be.

What You Figure Out

Will a single square piece of carpet equal the customer's order? If not, what two sizes added together will equal the square footage the customer wants?

Remember, the *size* of a square piece of carpet is the length of one of its sides. To get the total area of the carpet in square feet, square the length of one of its sides.

For example, if the customer ordered a total of 20 square feet of carpet, you could supply a 2-foot-squared piece of carpet and a 4-foot-squared piece of carpet.

$$2^2 = 4$$

$$4^2 = 16$$

$$4 + 16 = 20$$

What Else Is in Store

After the first few customers, you can use up to three pieces of carpet to fill each customer's order. Later, you can use up to four pieces of carpet.

Job Skills

- Determining squares and square roots
- Calculating sums of squares

The Security Store

Forgetful millionaires are lining up at Blanket Security because they can't remember the combinations to their safes. Fortunately, each combination is a number series that begins with the number 1. Now, it's a safe bet this store needs a smart clerk like you to come up with formulas that the millionaires can use to remember each number in their combinations.

Your Job

Please come up with a formula that, when applied to each number in the combination, generates the next number in the combination. Your formulas must be in the form $L \times \square + \square$. Except in the first case, where $L=1$, L always represents the number prior to the one being generated. You must decide what numbers belong in the boxes. Remember that the first number of every combination is always 1. So, for example, if you filled in $L \times 2 + 3$, you would generate the combination:

- 1 (always the first number)
- 5 ($1 \times 2 + 3$)
- 13 ($5 \times 2 + 3$)
- 29 ($13 \times 2 + 3$)
- 61 ($29 \times 2 + 3$)

Your job is to fill in the numbers that will generate the combination to the customer's safe.

What Happens

The customer's combination will appear on the right side of the screen. The formula $L \times \square + \square$ will appear at the left side of the screen. The blanks in the formula are where you will enter the two numbers to complete the formula. The machine will then show you the combination generated by this formula so you can see whether it matches the customer's combination.

What You Figure Out

One times what number plus what number equals the second number in the combination? When you substitute the second number for L, does the formula give you the third number in the combination? And so on.

For example, if the customer's combination is 1, 3, 7, 15, 31, the formula will be $L \times 2 + 1$:

$1 \times 2 + 1 = 3$ (the second number in the combination)

$3 \times 2 + 1 = 7$ (the third number in the combination)

$7 \times 2 + 1 = 15$ (the fourth number in the combination)

$15 \times 2 + 1 = 31$ (the fifth number in the combination)

What Else Is in Store

After the first few customers, you can choose between two different types of formulas for your number series. Later, you can choose among four different types of formulas.

Job Skills

- Solving functions
- Understanding number series
- Positive and negative numbers

The Party Shop

At Pat's Party Shop, every day is a party. Pat really likes to toot her own horn and promises to give customers the best deal on party horns and hats. Unfortunately, the current clerk is a party pooper. Can you go in and give the customers something to celebrate?

Your Job

Please choose the correct number of packages of party hats and horns to fill each customer's order. You will have two packages to choose from. Each package has a different number of hats and horns. You may give the customers as many of one or both packages as you want.

What Happens

At the top of the screen, you'll see the number of hats and horns the customer wants. The two different-sized packages appear on the left side of the screen. Each package is labeled with the number of hats and horns it contains. Decide what combination of package sizes will fill the customer's order.

What You Figure Out

What combination of packages will give you the right number of hats and horns to fill the customer's order?

For example, if the customer wants 8 hats and 9 horns, you would supply two of Package One (which contains 3 hats and 2 horns) and one of Package Two (which contains 2 hats and 5 horns).

$$2 \text{ (3 hats and 2 horns)} = 6 \text{ hats and } 4 \text{ horns}$$

$$1 \text{ (2 hats and 5 horns)} = 2 \text{ hats and } 5 \text{ horns}$$

$$\begin{array}{r} \\ \\ \hline 8 \text{ hats and } 9 \text{ horns} \end{array}$$

Job Skills

- Solving simultaneous equations

The Candy Shop

Just Jelly Beans is the sweetest shop in the mall. Customers line up to satisfy their sweet tooth and order bags of different colored jelly beans. Can you help out and fill orders? Pretty soon you'll have this job in the bag!

Your Job

Please choose the correct size bag and the correct number of bags to match each customer's order. Use the same size bag for all colors of jelly beans. You can choose any size bag you want. You can use more than one bag for each color, but you cannot mix colors.

What Happens

The number of ounces the customer wants of orange, blue, purple, and green jelly beans will appear at the top of the screen. You will decide what size bag to use to fill the order, and how many bags of that size you will need for each color. You can use any size bag over one ounce.

What You Figure Out

What size bag should you use? How many bags should you use for each color?

For example, if the customer ordered 3 ounces of purple, 6 ounces of green, 9 ounces of blue, and 12 ounces of orange jelly beans, you would pack the jelly beans in 3-ounce bags. The purple ones would fill one bag, the green ones two bags, the blue ones three bags, and the orange ones would fill four bags.

$$3 \times 1 = 3$$

$$3 \times 2 = 6$$

$$3 \times 3 = 9$$

$$3 \times 4 = 12$$

What Else Is in Store

After the first few customers, you can use two different-sized bags to fill the order. You cannot mix colors, but you can use one size bag to fill part of the order, and a different-sized bag to fill the remainder of the order.

For example, if a customer orders three ounces of purple, six ounces of green, five ounces of blue, and 10 ounces of orange, you would pack the purple and green jelly beans in 3-ounce bags (one bag for the purple and two bags for the green), and pack the blue and orange jelly beans in 5-ounce bags (one bag for the blue and two bags for the orange).

Job Skills

- Factoring
- Dividing whole numbers

The Machine Shop

Number-loving students flock to Phoebe's Functional Machine Shop to get their Function Machines activated. Function Machines are nifty devices made in Algebama. These machines are supposed to produce the customer's favorite number, but some customers can't figure out how to get their machines to produce this number. Each machine is installed with a different "mystery" function that uses the values X and Y. This store needs a clerk to choose values for X and Y so the Function Machines will produce the customers' numbers and keep those customers functional.

Your Job

Your job is to determine what values of X and Y will produce the number each customer wants. You can use any two numbers from 0 to 99. The "mystery" function inside each Function Machine will change from customer to customer.

What Happens

The number the customer wants the machine to produce will appear at the right side of the screen. The customer's Function Machine will appear at the bottom of the screen. Inside each machine is an unstated function. By plugging in different values for X and Y and seeing what comes out, you should notice patterns emerging. You may even be able to figure out exactly what function the machine is using. Then decide what values of X and Y the function needs to produce the customer's number.

What You Figure Out

Once you enter your first guess for X and Y, what number does the Function Machine produce? Try some other X and Y values. Can you figure out what the unstated function is? If so, what two values of X and Y in that function will produce the number the customer wants?

For example, if the customer wants the number 50, try entering a few random numbers into the machine. How does the answer compare to 50? Is the answer larger or smaller than 50? By how much? If you increase the value for Y, does the answer get smaller or larger? This kind of information can help you discover the right numbers to put in the Function Machine, even if you can't figure out exactly what the unstated function is. It is a good idea to have pencil and paper handy to keep track of the different numbers you put into the machine, and the relationship between X and Y and the number the customer wants.

What Else Is in Store

After you have served a number of customers, you will use two Function Machines to fill a customer's order. Both Function Machines contain unstated functions. You will first enter values for X and Y into the first Function Machine to produce a number. Then enter a value for Z. The output from the first Function Machine and the value for Z will then slide into the second Function Machine to produce the final

number. Choose values for X, Y, and Z that will produce the customer's number.

Use the same techniques you used to find the values of X and Y to find the value of Z.

Job Skills

- Solving functions with two variables
- Solving nested functions

The Pie Shop

Slice of Life Pies has been hit by lean times! Dieting customers are only ordering fractions of whole pies. To make matters worse, the store's hefty owner, Boss "Ton" Cream, has been sampling his stock and now there are only fractions of pies left. Can you work the pie cutting machine so customers can get their just desserts?

Your Job

Please cut a single piece of pie to fill each customer's order. You will have three different size pieces of pie to choose from. You may cut any fractional portion of that piece as long as the numerator of the fraction is not greater than the denominator.

What Happens

At the top of the screen, you'll see the fractional amount of a whole pie the customer wants. The three fractional pieces of pie you can choose from will appear on the shelf. The fractional size of each pie is stamped on the shelf under the pie. All the pies were the same size when they were whole. Choose one of the pieces of pie, and decide what fractional portion of it you need to cut to match the customer's order. For example, if you take $\frac{1}{3}$ of a pie and cut a $\frac{1}{2}$ portion of that, you will have $\frac{1}{6}$ of a pie.

What You Figure Out

By what fraction should you multiply the fraction of a pie to get the right answer?

For example, if the customer orders 1/10 of a pie, you would choose the 1/2 piece of pie from stock and multiply it by 1/5:

$$1/2 \times 1/5 = 1/10$$

What Else Is in Store

After the first few customers, you will have four different fractional pieces of pie to choose from. A little later there will be five different fractional pieces of pie.

Job Skills

- Multiplying fractions
- Simplifying fractions

The Ice Store

Rubic's Ice Emporium is famous for its gourmet ice shipped from Antarctica. Unfortunately, the customers want one-inch cubes, and Rubic's stock is in larger cubic blocks. Fortunately, the trusty Ice-cuber Machine can cut a cubic block of ice into one-inch cubes. Here's where you come in!

Your Job

Please work the Ice-cuber and fill each customer's order. Decide whether to put one or two cubic blocks into the Ice-cuber to match the exact number of one-inch cubes the customer wants. You can use any size cubic blocks you want.

What Happens

At the top of the screen you'll see the customer's order. Two blocks of ice will appear by the Ice-cuber. Decide whether one or two cubic blocks are needed to fill the customer's order, and what sizes they need to be.

What You Figure Out

Will a single cubic block equal the customer's order? If not, what are the sizes of the two cubic blocks needed to fill the

customer's order of one-inch cubes?

Remember, the size of a cubic block of ice is the length of one of its sides. The total cubic inches of a block of ice is the length of one side cubed (side x side x side).

For example if the customer orders 72 one-inch cubes, you could use a two-inch-cubed block and a four-inch-cubed block.

$$2^3 = 8$$

$$4^3 = 64$$

$$8 + 64 = 72$$

What Else Is in Store

After a while, you can use up to three blocks of ice to fill a customer's order. A little later, you can use up to four blocks of ice.

Job Skills

- Determining cubes and cube roots
- Calculating sums of cubes

The Equation Shop

In the Quality Equation Shop, math teachers come from miles around to have their favorite equations made complete. Their equations are in fine shape except one of the numbers in each equation is missing and in its place is the variable X. They want the Exciting Equation Machine to give them a value for X that will make their equations correct. What's needed is an equation-loving assistant to work the machine and make those math teachers happy.

Your Job

Please choose the value of X that will solve the equation in the Equation Machine. You can use any number from 0 to 99 for the value of X.

What Happens

An equation will appear in the Equation Machine. Enter a value for X that will solve the equation. The program will work through the equation to see if it works.

What You Figure Out

What value of X solves the equation?

For example, if the equation in the Equation Machine is $3X + 4 = 19$, you could enter the value 5 for X:

$$3X + 4 = 19 \quad 3(5) + 4 = 19 \quad 15 + 4 = 19$$

What Else Is in Store

After the first few customers, a slightly different equation will appear in the Equation Machine. Later, each equation will have X on both sides of the equals sign. This means you must use the same value for X on both sides.

For example, if the equation in the Equation Machine were $3X + 4 = X + 8$, you would enter the value 2 for X:

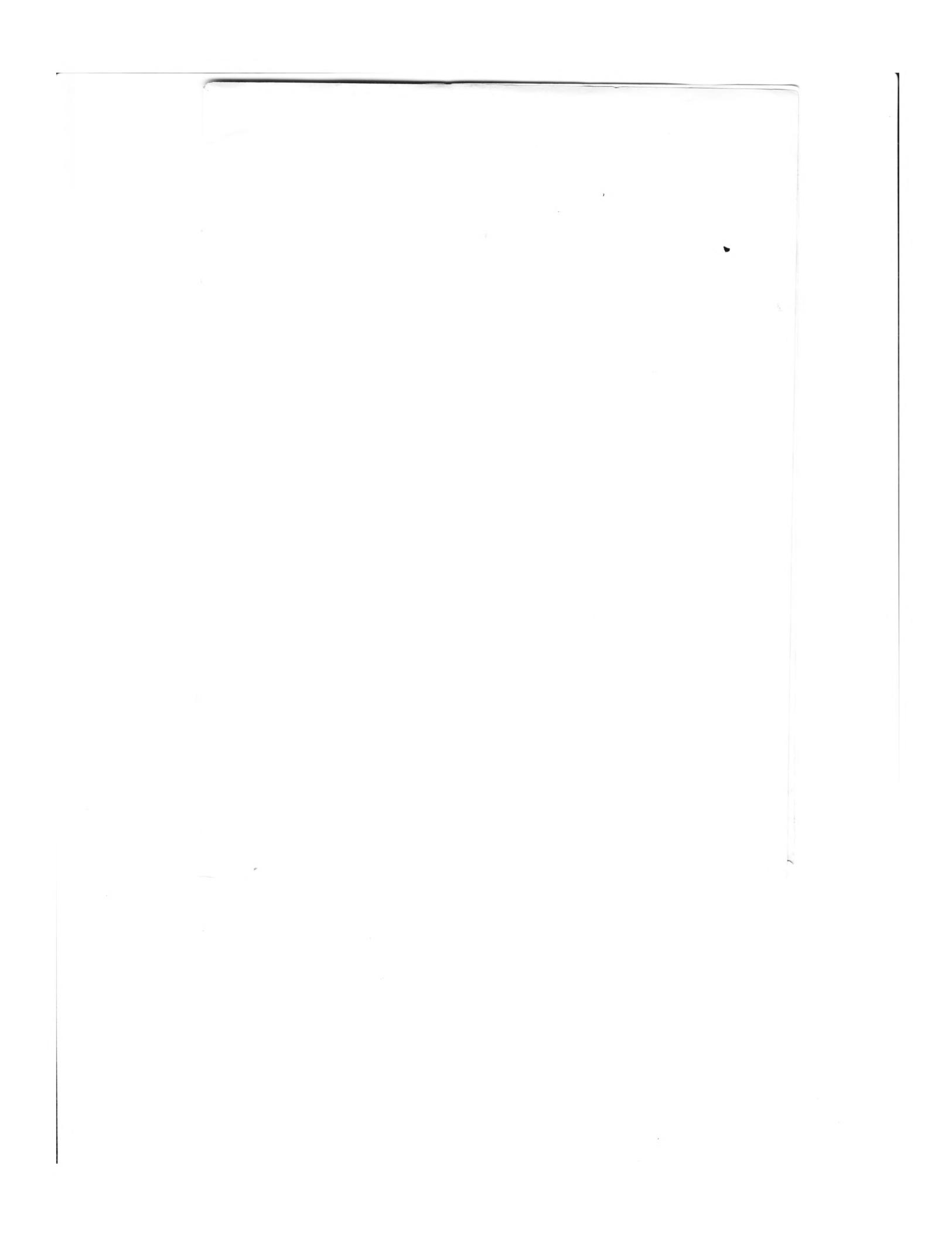
$$3(2) + 4 = 2 + 8$$

$$6 + 4 = 10$$

$$10 = 10$$

Job Skills

- Reduction of equations



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